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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/016,090

12/13/2001

David Clifford Long

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EXAMINER

POKER, JENNIFER A

ART UNIT

PAPER NUMBER

2832

DATE MAILED: 08/24/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/016,090

Applicant(s)

LONG ET AL.

Examiner

Jennifer A. Poker

Art Unit

2832

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 June 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 and 21-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 and 21-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 May 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date December 13, 2001.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____.

Art Unit: 2832

DETAILED ACTION

General Status

1. This is a second action on the merits of amendment received June 4, 2004 of application filed December 13, 2001. Claims 1-13 and 21-23 are pending and are being examined.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-6, and 21-23 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent Number 6,531,945 to Ahn, et al.

Regarding claim 1, Ahn, et al, discloses an integrated inductor comprising :

(1) a multi-layer substrate in which the multi-turn inductor is fabricated in (abstract; line 21; figure 1A);

(2) conductively interconnecting top and bottom conductive segments (220) for each turn; the portions being parallel to one another but in different layers of the substrate (figure 1A; column 4, lines 15-18);

(3) side conductive posts (210) which are parallel to one another and interconnect the top and bottom portions (220) (figure 1A; column 4, lines 15-17);

Art Unit: 2832

It can be seen in figure 1A that the cross-sectional area of the top and bottom portions is less than the cross-sectional area of the side posts.

Regarding claims 2 and 3, the conductive segments (220) of Ahn, et al, can be construed as wiring lines. They are located at top and bottom layers of the substrate and the top and bottom portions are in juxtaposition to other top and bottom portions respectively.

Regarding claims 4 and 5, Ahn, et al, further discloses that the substrate (110) has a plurality of paths (140) extending through the substrate (110). The paths (140) interconnect the top surface (120) and the bottom surface (130) of the substrate (110). The paths (140) can advantageously comprise vias (figure 1A; column 4, lines 5-17). The vias are filled with conductive posts (210), which connect the ends of the top and bottom portions (figure 1A; column 4, lines 15-16).

Regarding claim 6, Ahn, et al, further illustrates in figure 1A that the parallel conductive segments (220) have a length and the vias (140) are spaced along the length of the segments (220).

Regarding claims 21 and 22, Ahn, et al, further illustrates in figure 1A that the top and bottom segments (220) are planar in shape and have a width and a thickness less than a length, and the side vias (paths—140) have a circular contact surface, which contacts the ends of the planar top and bottom segments.

Regarding claim 23, Ahn, et al, further illustrates in figure 1A that the top and bottom portions are of unequal length in juxtaposition.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 2832

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Number 6,531,945 to Ahn, et al, in view of U.S. Patent Number 5,884,990 to Burghartz, et al.

Ahn, et al, discloses the claimed invention except for the toroidal shape of the inductor.

Burghartz, et al, discloses a high quality factor spiral and toroidal inductor and transformer deposited in a trench formed in a dielectric layer. A toroidal inductor has a larger inductance than the spiral inductor. The magnetic flux is confined within the loop and does not stray, which allows for high Q-factors at high inductance values and reduces the possibility for coupling between adjacent inductors. (Column 8, lines 56-67)

One skilled in the art, at the time the invention was made, would have found it obvious to combine the teachings of Ahn, et al, with the teachings of Burghartz, et al, and form a toroidal shaped inductor in order to allow for high Q-factors and to reduce the possibility of coupling between adjacent inductors.

6. Claims 8-10 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Number 6,531,945 to Ahn, et al, in view of U.S. Patent Number 6,459,352 to Liu, et al.

Regarding claims 8 and 9, Ahn, et al, discloses the claimed invention except for the tuning capabilities.

Liu, et al, discloses the two inductors (windings) located within a dielectric area, a connection to "inside" terminals, i.e. the terminals at the respective centers of the windings, can be made by tapping into the inside terminals from a layer above or below the layer in which the primary

Art Unit: 2832

winding and the secondary winding are fabricated. Moreover, tapping into the outside terminal can make a connection to the "outside" terminal of the secondary winding from a layer above or below the layer in which the primary winding and the secondary winding are fabricated. (Abstract) (Figure 1) (Columns 9 and 10, lines 66-67 and 1-5 respectively)

One skilled in the art, at the time the invention was made would have found it obvious to combine the teachings of Ahn, et al, with the teachings of Liu, et al, and tap the inductor in order to tune it.

Liu, et al, further states, that an individual inductor's size limits the use of inductors to build transformers for RF and mixed signal circuits. Second, the inductor's quality factor would be too low if the inductor's size is too large. It would have been obvious to one having ordinary skill in the art, at the time the invention was made, to utilize the teachings of Liu, et al, and decreasing the size of the inductor within the dielectric are in order to increase the inductance. (Column 3, lines 1-3)

Regarding claims 10 and 13, Ahn, et al, discloses the claimed invention except for the use of a second inductor.

Liu, et al, discloses the use of two inductors, forming a transformer, each comprising a number of turns, each turn having a top and a bottom interconnecting portion, parallel to one another but in different layers of the dielectric area, and two side vias parallel to one another and connect the top and bottom portions at their ends. The top interconnect is located in the top layer of the dielectric area, and the bottom interconnect is located in the bottom layer of the dielectric area. For the two inductors (windings) located within the dielectric area, a connection to the "inside" terminals, i.e. the terminals at the respective centers of the windings, can be made by tapping into the inside terminals from a layer above or below the layer in which the primary winding and the secondary winding are fabricated. Moreover, tapping into the outside terminal can make a

Art Unit: 2832

connection to the "outside" terminal of the secondary winding from a layer above or below the layer in which the primary winding and the secondary winding are fabricated. (Abstract) (Figure 1) (Columns 9 and 10, lines 66-67 and 1-5 respectively)

One skilled in the art, at the time the invention was made, would have found it obvious to combine the teachings of Ahn, et al, with the teachings of Liu, et al, and incorporate a second inductor in order to tune or alter the inductance of the device.

7. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Number 6,531,945 to Ahn, et al, in view of U.S. Patent Number 5,461,353 to Eberhardt.

Ahn, et al, discloses the claimed invention except for the plate added to tune the inductor.

Eberhardt discloses a printed circuit board inductor wherein an inductance tuning means, such as metallized runners, are incorporated. (Column 4, lines 53-63) The inductance adjustment runners are metallized runners, which short some of the turns of inductor. In order to increase the inductance value of inductor, one or more of the adjustment runners are cut using well known laser trimming equipment or by simply mechanically cutting one or both runners. (Column 3, lines 51-60)

One skilled in the art, at the time the invention was made, would have found it obvious to combine the teachings of Ahn, et al, with the teachings of Eberhardt and incorporate an inductance tuning means such as metallized runners connected to the inductors in order to increase or decrease the inductance.

Response to Arguments

8. Applicant's arguments with respect to claims 1-13 have been considered but are moot in view of the new ground(s) of rejection.

Further arguments are addressed below:

- (a) objections to the drawings are withdrawn;
- (b) objections to the claims are withdrawn;
- (c) rejections under 35 USC 112, second paragraph, are withdrawn.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Art Unit: 2832

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Poker whose telephone number is 571-272-1997. The examiner can normally be reached on 4:30-3:00 Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Elvin G. Enad can be reached on 571-272-1990. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jap
August 19, 2004


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